VIRGINIA PAPER-TAPE INPUT RECORD AND PARALLEL DESCRIPTION OF THE NASA MAGNETIC TAPE FOR 1401 AND 1410 SEARCH

The program as revised to 1 September 1966

APPENDIX I

to Letter Report on
NASA Grant NGR 47-005-036

OUTPUT STAFF

Robert Tomlin, Jr.

Alice Jacqueline Feeman

INPUT STAFF

Elaine Pleasants

Anthea Hailey

Curtis Brooks

UNIVERSITY OF VIRGINIA LIBRARY
CHARLOTTESVILLE, VIRGINIA

Report No. UVAL-4031-101-66U

September 1966

VIRGINIA PAPER-TAPE INPUT RECORD AND PARALLEL DESCRIPTION OF THE NASA MAGNETIC TAPE FOR 1401 AND 1410 SEARCH

The program as revised to 1 September 1966

APPENDIX I

to Letter Report on
NASA Grant NGR 47-005-036

OUTPUT STAFF

Robert Tomlin, Jr.

Alice Jacqueline Feeman

INPUT STAFF

Elaine Pleasants

Anthea Hailey

Curtis Brooks

Report No. UVAL-4031-101-66U

September 1966

TABLE OF CONTENTS

THE VIRGINIA INPUT RECORD

INTRODUCTION

The Virginia Input Record (VIR) is intended to serve as a complete source of information for the computer work which will be done in connection with the NASA project. In its basic form, this record will be punched on paper tape, although there will also be maintained a magnetic tape reel which will contain images of such records (possibly with some sort of editing having been performed, although a 1403-tape will require some of the characters that will be eliminated from both the 1401- and 1410-tapes.)

Besides the usual letters, digits, and punctuation marks of the character set, the VIR will also contain the upper case character "[", and the lower case character "+" (in the sense of B-5500 internal representations corresponding to the Flexowriter paper tape codes). These characters will be retained on the basic magnetic tape reel, even though they will, of course, be edited out when any NASA records or line printer outputs are being produced.

The VIR is produced by means of typing and punching simultaneously on a Flexowriter. Consequently, the notions of "carriage return" (denoted by C / R and corresponding to the character "←" in the B-5500 internal representation scheme) and "tab" (denoted by TAB and corresponding to the character "]") are involved, and their associated paper tape punches will always be present in the VIR. Lines in the VIR will not amount to more than 45 characters (the absolute physical limit of 50 is prohibited, but as many as 47 are allowed in cases of extreme need when the possibility of their overrunning the machine card printout is accepted) after the upper-case, lower-case punches have been edited out. This restriction is present because of the need to be able to produce catalogue cards on the line printer. Typically, the C/R and TAB characters are used as markers in the VIR, although the combination C/R TAB is normally one which will be edited out in any computer scanning of the record. The complete details of this are given below.

That which follows is a description of the VIR which is intended to show in detail the markers, flags, etc., which set off and distinguish the various fields of the record.

Throughout the following, any field which is optional will be embraced by wedge-like brackets "< >".

Further, it is the case that the entire format described here is also shown in condensed, schematic form on page 36 of this document.

FORMAT OF THE VIR

Field	Remarks
C/R C/R . . . C/R	Three or more carriage returns in succession. Such a field marks the beginning of a record, and, perhaps, the ending of a previous record.
Main Author	This field consists of any string of characters not containing the triple C/R TAB TAB. Any occurrences of the pair C/R TAB must, of course, be edited out. This field will be used as the first entry in the field "Personal Authors" of any NASA records produced. For the present, the VIR will always have a personal author in this position, or else the words "NO PERSONAL AUTHOR," and this personal author's name will be all caps in the form Last name, comma, blank, First Initial, period, blank, Second Initial, period, and when required a further string (e.g., comma blank, JR, period; or blank, third initial, period). Certain additional peculiarities of the machine form are to be observed: e.g., internal blank in all MC and MAC forms (MC BEE, not McBee or MCBEE, and MAC DONALD, not MACDONALD); some Slavic initials are in two letters (IA., IU., ZH.); hyphenated initials, common in oriental

names (see the CHEN, WAN, WANG entries in NASA indexes), are in the form: initial, period, hyphen, initial, period ("T.-N."; i.e., no internal blank); prefixes (DU, LE, VON, etc.) are to be checked in all cases with the most recent NASA indexes, and whenever the following of a machine form introduces a real peculiarity, the normal form is to be added as though it represented a joint author (compare, from current NASA indexes, VON KARMAN, VAN DE GRAAFF, but not VON FRAUNHOFER or VON HELMHOLTZ or VON LAUE; LAPLACE, not DE LAPLACE, but DE LAVAL, not LAVAL).

For further peculiarities of author entries, see the c-cedilla or joint author section, post.

C/R
TAB
TAB

A carriage return followed by two tabs. This marks the end of the "Main Author" entry in the record.

Title

Any string of characters not containing a period which is followed by two blank spaces. The pair C/R TAB may be present, and will be edited out for any NASA work. This entry in the VIR will be used as the "Title" field of any NASA records produced.

Original titles of translated works, originally planned for addition at this point in parentheses, have been removed to the title—note slot (circumflex) in order not to clutter up the KWIC title search now being designed by Langley.

• Spaces	A period followed by two blank spaces. This cluster marks the end of the "Title" entry.
Descriptive Note (imprint)	Any string of characters not containing the triple C/R TAB TAB. The C/R TAB may be present, and it should be edited out for NASA work. This field will be used as the "Descriptive Note" field of any NASA records which are produced. The last three characters of the field have the form "YYZ" where YY is the pair of digits corresponding to the year in "Report Date" (within the NASA record), and Z (a period) is ignored. Note that in a 2-vol. work, the date "1964-65." is okay and will yield "65" for the NASA record, but "1964-5." is prohibited as entering on the mag tape an incomprehensible "-5".
C/R TAB TAB	A carriage return followed by two tabs. This field marks the end of the "Descriptive Note".
Junk	Simply junk, from the mag tape view, consisting of non-blank characters only, (e.g., p. 156-160).
Number of Pages	A field which is either of the form "XXXbp.", or "XXXbl.", or "XXXbv." where "b" denotes the character, blank. This is used to construct the "Number of Pages" entry in any NASA records produced. The nature of this is as follows:

If the form is "junk XXXXbp." or "junk XXXbl." (e.g., "p. 156-204; ie, 159 p.") then the XXXX part is scanned, and the 1-4 rightmost consecutive decimal digits involved are used as the number of pages.

Note the form "ie", rather than "i.e.," the shortening by 2 characters being essential to provide pre-tab space, when the tab is set far enough back for a maximum length call number without C/R.

If the form is "XXbv.", then the XX part is examined and the two or fewer rightmost digits followed by "blank v." are used as the number of pages.

TAB

The TAB character.

Report Number
(Segment One)

This field, which is the "LC call number", is inserted as the first segment of the "Report Numbers" field of any NASA records produced.

The field must not exceed thirty characters in length, and must not contain C/R.

NOTE: Since the LC and Dewey class marks are on separate mag tapes from the STAR and IAA tapes, which produce a different kind of report number, and since in 800 samples only one bona fide report number has been encountered, the use of this field for call numbers does not seem to require a separate flag to set up shelf-list order printouts of LC or Dewey numbers; but conversely, these tapes

	are required for a search of bona fide report numbers uncluttered with call numbers, so bona fide report numbers are to be separately flagged as indicated below, i.e., thru use of the <REPORTN> flag.
C/R TAB	A carriage return followed by TAB. This marks the end of the field containing the first segment of the "Report Numbers" field.
Accession Number	A field of the form: "YYV-XXXXX", where YY are the digits of the year involved, V denotes that this is a Virginia-produced record, and XXXXX is a five digit number. With the hyphen (-) removed, this is used as the ACCESSION NUMBER in any NASA records which are produced.
SPACE ISSUE NUMBER SPACE	One or more blank spaces, followed by the 2-digit ISSUE NUMBER, followed by one or more blank spaces. Since no announcement bulletin is presently involved, these digits have been used to mean 01 = "Book at Langley", and 02 = "Book at HQ Library."
Subject Category	A field of the form, "XX", where XX is a two-digit number. This is used as the STAR subject category in any NASA records produced. For the subject category in COSATI form, see post.

TAB	The TAB character.
Report Number (Segment Two)	Any string of characters not containing C/R. This entire string, which is never as many as fifteen (15) characters in length, will be placed left-justified in the second segment of the REPORT NUMBERS field of the NASA record associated with this Virginia record. It is the Dewey classification, and carries no following Cutter number, since this would only duplicate the second part of Segment One, i.e., the LC call number.
C/R C/R TAB TAB	Two carriage returns followed by two tabs. This field marks the end of the second segment of the REPORT NUMBERS entry.
<C-Cedilla>	This is a "capital 2" (Cedilla), or, if the upper-case-lower-case information is being ignored, this is the digit, 2. This is an optional field, as is indicated by the wedges (<,>) which embrace the field. When present, the field serves to mark the beginning of the second entry in the NASA PERSONAL AUTHORS field. Since all author and joint author entries on the mag tape are personal authors, the problem of corporate entries is handled post, under BACK SPACE.

When a corporate author would with LC correctly become the main entry, a personal name is nevertheless entered in the main entry slot, if any such name, even as editor or conference chairman, appears on the title page; otherwise the words "NO PERSONAL AUTHOR" appear there and the editor's name (when not on the title) would appear as a C-Cedilla, as would the names of 2nd or 3rd editors whose names did appear on the title.

Joint authors are given without indication of joint authorship (DOAKS, J., not DOAKS, J., JT. AUTHOR), since present search programs are designed for exact drops, but the decision on whether

, ED.
, CHAIRMAN
, COMP.
, TR.

appear after a personal author's name will remain with the editor, whose decision will be based on whether the searcher will want the entry dropped with a straight author search.

It is not intended to introduce translator's names systematically unless quite easily supplied, but it is intended to introduce them in all cases in which calls for the book might be made under a translator's name, and in all cases where multiple translations of varying quality have been (or might be) made of an important scientific work.

<Joint Author>	This is an optional field which is present if and only if the Cedilla, or "capital 2", field, above, is present. It consists of any string of characters not containing the triple C/R TAB TAB. The pair C/R TAB may be present and require editing out to produce NASA records. If present, this field is used as the second entry in the PERSONAL AUTHORS field.
<C/R TAB TAB>	This optional field consists of a carriage return followed by two tabs. It marks the end of the above Joint Author entry.
<C-Cedilla>	This is an optional field, consisting of a capital two. If present, it indicates that another Joint Author field follows.
<Joint Author>	This optional field consists of any string not containing the triple C/R TAB TAB. The pair C/R TAB may be present and requires editing out. If present, this field will be used as the third entry in PERSONAL AUTHORS.
<C/R TAB TAB>	This optional field consists of a carriage return followed by two tabs. If present, it marks the end of the above Joint Author field. NOTE: The <Cedilla>, <Joint Author>, <C/R TAB TAB> construction will be repeated for as many times as needed to indicate all the joint authors, each of which is an entry in PERSONAL AUTHORS. There is no limit to the number of these on the VIR, but only the first 12, if there are that many, are transferred to the NASA tape.

<Λ>
<Circumflex>

The circumflex character, which is an optional field marking the beginning of a Title Note field.

The B-5500 character here is capital ">" or, simply ">", depending as upper-case-lower-case information is being scanned or ignored.

<Title Note>

This is an optional field consisting of any string of characters not containing the triple C/R TAB TAB. The pair C/R TAB may be present and requires editing out. This field will be used as the first entry in the NASA TITLE NOTE field.

<C/R TAB TAB>

If used, this optional carriage return followed by two tabs marks the end of a Title Note field.

The circumflexes fall into two categories:

Additional title notes not presently available to any search system; e.g., original language titles of translated works. Thus any important half-title or sub-title needed for a KWIC title program will have to be introduced into the main title field without an intervening double blank. See above.

Numbered Publishers' series. If there is one, then besides appearing here in full, it also appears below under <CONTRCT> in the 15-character unit form "$:ADV IN PHYS 2", the paper-tape colon (mag - &) providing a separation from the alpha-numeric sort of the bona fide contract numbers.

NOTE: The construction < ^ >, <Title Note>, <C/R TAB TAB> will be repeated as many times as needed to supply entries for the TITLE NOTE field of the NASA record. Only the first 12 of these are transferred to NASA tape.

<Back Space>

The back space character, which is an optional field marking the beginning of a CORPORATE SOURCE field.

The B-5500 character here is "≠", in either upper or lower case.

<Corporate Source>

This is an optional field consisting of any string of characters not containing the triple C/R TAB TAB. The pair C/R TAB may be present and requires editing out. This field will be used as an entry in the NASA CORPORATE SOURCE field.

When these occur, as commonly with conferences, they are to appear below also as <CORPSCE>, with the 8-digits (i.e., two 4-digit groups) from the NASA Corporate Source Listing. A separate listing of new corporate authors is to be compiled.

Note that conference sponsoring agents like Boeing, NASA, or American Chemical Society (sometimes all three such kinds of agencies for one conference) may be flagged as corporate sources, but corporate entries such as "International Conference on Solid State Physics" are to be made searchable by flagging as Publishers' Series.

<C/R TAB TAB>	If used, this optional carriage return followed by two tabs marks the end of a CORPORATE SOURCE field. NOTE: The construction, <Back Space>, <Corporate Source>, <C/R TAB TAB>, will be repeated as many times as needed to supply corporate source entries. Only the first 8 of these will be transferred to NASA tape.
- (capital 1) or " (capital 3) or ' (capital 5) or & (capital 7) or * (capital 8)	This field, consisting of a capital one, three, five, seven, or eight, marks the beginning of a subject term field, and serves to indicate the type of the term. Here, 1 denotes a machine term, 3 denotes a published term, 5 denotes an LC term, 7 denotes a new term, and 8 denotes a tape term which we wish to print out for Virginia purposes but will appear on the NASA tape as a machine term, being renumbered there with a 1. The 7-terms are designed for Virginia print-out use, and will consist of (a) Terms not yet adopted by NASA, but which may later be adopted and if so, these will be renumbered 1 or 3. (b) Terms existing in NASA as 1-terms, and they will so appear on the NASA tape. This capability exists, but has not been used in the first 2m VIR entries. The option exists to strip the 5 and 7 terms at any time from the search tapes.

It should be noted that some of the LC (5) terms are exact duplicates of NASA (3) terms and thus appear twice on the tapes, once for card print out, and once for Subject search; and that many of the LC (5) terms differ only slightly in form from NASA (3) terms. (e.g., 5GROUPS, THEORY OF = 3GROUP THEORY, 5HYDROCARBONS = 3HYDROCARBON.) These also, of course, appear in both forms for the same reason.

<Subject Term>

This field consists of any string of characters which does not include two-successive blank spaces.

If a C/R TAB pair occurs within the string, then the term being specified is obtained by editing out the C/R TAB.

SPACE
SPACE

Two or more blank spaces.
Such a field marks the end of a subject term.

NOTE: The construction (capital 1, 3, 5, 7, or 8), Subject Term will be repeated for as many terms as are to be supplied. Each such term will be placed in the VOCABULARY (or SUBJECT) TERMS field of any NASA records which are produced.

There is at present a limit of 32 such terms on the VIR, and there is an input requirement that NASA terms appear in alphabetical order on the VIR within their categories; i.e., the order of terms is (1) LC-5 terms in LC order, not alphabetized; (2) NASA-3 terms alphabetized;

	(3) NASA-1 terms alphabetized; (4) any other categories individually alphabetized. The alphabetization is not an absolute requirement, but speeds the sort for the NASA tape arrangement.
C/R C/R	Two carriage returns. This field marks the end of the collection of Subject Term fields.
<CORPSCE>	This is an optional field, whose presence indicates that the field which follows immediately is a CORPORATE SOURCE CODE PACKAGE. See above, p. 12, under <Back Space>.
<CORPORATE SOURCE CODE PACKAGE>	This consists of two four-character packages, separated from one another by at least one blank space. These are derived, when they are present, from the constantly updated NASA Corporate Source Authority List. When not there, an interim supplement of Corporate Sources has a temporary number supplied on a list kept at the input source.
CST	This field must be followed immediately by the three character COSATI INDEX NUMBER.
<CONF>	This optional field consists of the word, "CONF". If it is present, then CONFERENCE OR SYMPOSIUM is set to 1, else 2.

When this field is used, the VIR will feature "3CONFERENCE" as a Subject heading, will have a CONF flag, and will carry (as per instructions on p. 17) the special flag "CONTRCT $:650115", the six digits following the colon being made up, in this order (so that root search may be made when year and month but not day are known), of the year, month, and day, of the beginning of the Conference.

<AUTHAFF> — This optional field consists of the word, "AUTHAFF". If it is present, then PERSONAL AUTHOR AFFILIATION is set to 1, else 2.

<ET. AL.> — This optional field consists of the words, "ET. AL." If it is present, then the ET. AL. is set to X, else to a blank.

<LANG> — This optional field consists of the word, "LANG". If present, it must be followed by a two digit number which will be used as the DOCUMENT LANGUAGE (e.g., 31 = French; 32 = German). If this field is absent, the number 01 is used.

<NOCPYRT> — This optional field consists of the word, "NOCPYRT". If it is present, then COPYRIGHT is set to 2, else 1.

<ANLYT-2> or <ANLYT-3> — An optional field consisting of either "ANLYT-2" or "ANLYT-3". If the field is present, then HANDLING is set to 2 or 3, depending as the field equals "ANLYT-2" or "ANLYT-3", respectively.

If the field is absent, then HANDLING is set to 1. ANALYT-2 is the mother-entry of an analyzed volume; ANALYT-3 is used for each of the siblings.

<LSANLYT>

This optional field (supplied on the ANALYT-2 mother-entry of any analyzed volume, is from the accession number of the last ANALYT-3 sibling) consists of the word, "LSANLYT". If it is present, then it must be followed by a field of the form "YYXXXXX". Here YY must be the two digits of the year, and XXXXX is a five digit document number. LAST ANALYTIC ACCESSION will be set to YYVXXXXX in this case.

If the "LSANLYT" field is absent, then LAST ANALYTIC ACCESSION is set to blanks.

<CONTRCT>

This optional field consists of the word, "CONTRCT". If it is present, then one or more contract numbers follow. See page 11 for use of this field as Publishers' Series Indicator and page 16 for use to record the Conference date.

<$>

A dollar sign (equal to capital 4 in B-5500 internal representation). This marks the beginning of a CONTRACT NUMBER field.

<Contract Number>

This optional field consists of any string of characters not containing a dollar sign ($= capital 4), and not exceeding thirty characters in length.

This field may not contain C/R, or C/R in combination with any other characters. That is to say, the encountering of a C/R in a Contract Number will serve to indicate that the end of the number has been reached, in just the same way that encountering a $ indicates that the end has been reached.

In the case of the dollar sign, of course, the beginning of a new Contract Number is also indicated.

True (real) contract numbers appear without an initial colon, but they are rare on this record. The CONTRCT $: flag is used here to sort and search the Conference dates, the Publishers' Series Circumflexes, and the like.

NOTE: The construction $ Contract Number will be repeated for each number supplied, and each such number will be placed in the CONTRACT NUMBERS field of the NASA records produced.

<REPORTN> This flag precedes a true (real) report number. It must be separated by at least one space from the number itself.

<Report Number> Any string which begins with a colon and contains only non-blank characters. The colons distinguish the true (real) report numbers, which are quite rare in VIR, from the call numbers.

Report numbers so supplied are to have no blanks, which if called for are to have hyphens supplied in lieu of. One space must be placed after last digit of report number.

Only the first 8 report numbers are transferred to NASA tape.

C/R
C/R
.
.
.
C/R

Three or more carriage returns. This field marks the end of the Virginia Input Record (VIR).

Clarification on C/R TAB Editing

Where the editing out of the C/R TAB combination has been mentioned above, it should be noted that there are actually two editing rules:

(1) For all items preceding the <Subject Terms> portion of the VIR, removal of a C/R TAB pair is accompanied by the insertion of a blank.

(2) In the remaining portions of the VIR, no such insertion of blanks is performed. That is to say, editing out of a C/R TAB pair causes the two characters immediately preceding and following it to become adjacent characters in the resulting, edited VIR.

FURTHER NOTES

The items appearing in the optional fields which make up the last portion of the record must be set off from one another by one or more blank spaces. In all cases (other than exceptions (i), (ii), and (iii), below), the pair C/R TAB (or C/R) can also be present and will be edited out. The exceptions are as follows:

(i) Between the field "LANG" and the two-digit number which follows, only blank spaces are permitted.

(ii) Between the field "LSANLYT" and the seven-character field which follows, only blank spaces are permitted.

(iii) Between the field "CORPSCE" and the two four-character packages which follow, only blank spaces are allowed.

In general, the optional field words in this last portion of the record cannot be broken by the insertion of characters such as C/R, TAB, etc. As was noted above, it is also not permissable to continue Contract Numbers from one line to the next.

Finally, as many as ninty-nine (99) Virginia Input Records may be placed on paper tape. It is required, however, that the collection of three or more carriage returns following the last such record be followed by a STOP CODE (4-2-1) punch on the tape, corresponding to the B-5500 internal representation for " # ". Any amount of feed may be present between the last record and this 4-2-1 punch.

THE NASA RECORD

FIXED LENGTH Portion

Size	Field(s)	Remarks
1	WDMK	This will denote a word-mark.
2	Issue	A two-character field which will be set from the Issue Number given by the VIR.
1	WDMK	This entire package is called the accession number.
2	YEAR	Year consists of two digits, e.g., 66, Type will be
1	TYPE	the letter, V, for our work, and Number is a five-
1	WDMK	digit number.
5	NUMBER	
1	WDMK	
4	Record Size	Four digit count of all characters except word marks (i.e., word separator characters).
1	Document Security	Constantly equal to 1.
1	Title Security	Constantly equal to 1.
1	Declassification Code	Set to blank.
1	WDMK	
2	Subject Category	As specified by VIR.

Size	Field(s)	Remarks
1	NASA Supported	Constantly equal to 2.
1	WDMK	
1	No Foreign	Set to blank.
1	Conference or Symposium	Equal to 2 unless the option "CONF" is present, then 1.
1	Corporate Source Supplementary	Equal to 2.
1	Personal Author Affiliation	Equal to 2, unless the option "AUTHAFF" is present, then 1.
1	Foreign Document	Set to blank.
1	Receipt Type	Set to blank.
5	Acquisition Number	Set to blanks.
6	Receipt Date	Set to blanks.
6	Report Date	Set to 0000YY, where YY are the two digits for the year in Report Date as specified by VIR.
1	Abstract	Set to blank.
1	Abstract Language	Set to blank.

Size	Field(s)	Remarks
2	Document Language	Equal to 01 unless the option "LANG" is present, in which case the 2 low-order digits of the next option field are used for the Document Language.
1	Reproducible	Set to blank.
1	Copyright	Equal to 1 unless the option "NOCPYRT" is present, then 2.
1	Microfiche	Set to blank.
2	Document Type	Set to blanks.
2	Microfiche Codes	Set to blanks.
1	Document Class	Constantly equal to 5.
1	Handling	Equal to 1 unless the option "ANLYT-2" is present, then 2, or the option "ANLYT-3" is present, then 3.
1	Et. Al.	Equal to BLANK unless the option "ET. AL. " is present, then X.
8	Last Analytic Accession	Equal to blanks unless the option "LSANLYT" is present, then the field YYXXXXX, which follows immediately, will be used with year=YY, & number=XXXXX.
2	Source	Set to blanks.

Size	Field(s)	Remarks
2	Origin	Set to blanks.
4	Number of Pages	As specified by VIR.
3	COSATI Index	As specified by VIR.
2	Undesignated	Set to blanks.
2	Conversion Code	Set to blanks.

RELATIVE IMAGE Portion

The RELATIVE IMAGE portion of the NASA record consists of eleven four-character fields[1], each of which is preceded by a word-mark character. Thus the total length of this field is forty-four characters, excluding the word-marks, of course.

The FIXED LENGTH portion of the record occupies characters one through eighty of the NASA record (excluding work-marks, of which there are six), and the RELATIVE IMAGE consists of characters eighty-one through one-hundred-twenty-four (one-hundred-twenty for the 1410 system).

Each entry in the RELATIVE IMAGE corresponds to some field in the VARIABLE LENGTH portion of the NASA record. A blank entry (WDMK followed by four blanks) serves to indicate that the associated field in the VARIABLE LENGTH portion is empty for this record. Any

[1] This is the description for the 1401 system. In the case of the 1410, the RELATIVE IMAGE consists of only ten fields, since the coded terms are absent.(see the more recent note on page 31).

non-blank entry will consist of a number which serves as a pointer to locate the associated field in the VARIABLE LENGTH portion.

Specifically, the entry indicates the number of characters, beginning with character eighty-one (81) as a base, which must be skipped over to arrive at the KEY character of the associated field. For example, the field, TITLE, always has a RELATIVE IMAGE entry equal to WDMK0045[2], indicating that characters 81 through 125[3] must be skipped over in order to arrive at character 126[4], the beginning of the TITLE field, which is the KEY character in this case.

Listed in order of occurrence, the VARIABLE LENGTH portion fields which correspond to the RELATIVE IMAGE entries, together with their KEYS, are as follows:

FIELD NAME	KEY CHARACTER
TITLE	Leftmost character of first segment
TITLE NOTE	" " " " "
*** NOTATION OF CONTENT	" " " " "
*** HISTORICAL NOTE	" " " " "
DESCRIPTIVE NOTE	" " " " "
PERSONAL AUTHOR(S)	Fifteenth character of first segment
CORPORATE SOURCE	Sixtieth " " " "
REPORT NUMBER(S)	Fifteenth " " " "
CONTRACT NUMBER(S)	Fifteenth " " " "
SUBJECT TERMS	Eleventh " " " "
CODED TERMS	Sixth " " " "

[2] WDMK0041 in the 1410 system.

[3] 121 in the 1410 system, (see the note on page 31).

[4] 122 in the 1410 system, (see the note on page 31).

The ***'d fields are always empty in the Virginia-produced NASA records.

The VARIABLE LENGTH Portion

The VARIABLE LENGTH portion of the NASA record consists of ten fields,* each of which is preceded and followed by a dollar sign ($). These fields are in one-to-one correspondence with, and in the same order as, the entries in the RELATIVE IMAGE, as described above. That a field is empty is indicated by placing its embracing dollar signs next to each other and without any intervening space.

Each field is composed of what are called segments, and the number of segments in any given field is completely arbitrary, within space limitations, of course. Associated with each segment there is a wordmark; for the first five fields, the segments feature trailing wordmarks, i.e., the last character of each segment is preceded by a wordmark. For the last six fields, leading wordmarks are used, i.e., each segment is preceded by a wordmark.

The rules governing the lengths of the segments are given in detail below. As a general rule, however, the segments in the first five fields are permitted to be variable in length, up to some maximum size, and the segments in the last six fields are of fixed length.

The Fields

Field Name	Remarks
TITLE	This field is composed of variable length segments which may be a maximum of 50 characters in length, and which feature a trailing wordmark. A maximum of eighteen of these variable length segments is permitted. The relative image reference for the TITLE is the leftmost character of the first segment.

* Eleven fields if the CODED TERMS are included.

Field Name	Remarks
	The Title field of the VIR will be inserted as the first segment of the TITLE in any Virginia-produced NASA records.
TITLE NOTE	This field has the same structure as TITLE, except that the maximum number of segments is nine. The Title Note portions of the VIR will be used as segments in this field for any NASA records produced at Virginia.
NOTATION OF CONTENT	This field has the same structure as TITLE, except that the maximum number of segments is four. This field is not used in Virginia-produced NASA records, and it is not used on the 1401 system.
HISTORICAL NOTE	The structure of this field is entirely identical to that of TITLE NOTE. This field is not used in Virginia-produced NASA records.
DESCRIPTIVE NOTE	This field consists of variable length segments which feature a trailing workmark and a maximum size of fifty-two characters. The maximum number of such segments is ninty-nine. The relative image reference for DESCRIPTIVE NOTE is the leftmost character of the first segment.

Field Name	Remarks
	Each segment in this field contains, as its two leftmost characters, a segment number, the significance of which is as follows:

Segment Number	Corresponding Data
07	Catalog dates (day, month, year)
08-11	Corporate source supplement (subsidiary element, e.g. division or lab)
12-18	Personal author affiliation
19	Temporary traveler number
21	N number (including CN and SN)
23	T number
40-64	Imprint, reprint, collation, publication data
65-69	Supercession note
70-89	Availability and pricing (OTS, GPO, etc.)
90-99	Declassification notice

In Virginia-produced NASA records, the imprint information will always be inserted.

PERSONAL AUTHOR(S)

This field is composed of segments which are multiples of 15 characters in length. Each such segment features a leading wordmark.

These segments contain the Main Author and Joint Author (etc.) fields in the Virginia-produced records.

The MAXIMUM LENGTH OF ANY SUCH SEGMENT IS FORTY-FIVE CHARACTERS, although the total number of segments is unlimited. The relative image reference KEY for PERSONAL AUTHOR(S) is character fifteen (15).

Field Name	Remarks
CORPORATE SOURCE	This field consists of 1-4 segments per source, these segments each having a length of sixty characters, and featuring a leading wordmark. The relative image reference KEY for CORPORATE SOURCE is character sixty (60). The first eight characters of each segment is a term number, and the segments must be in ascending order relative to this number. The first eight characters of each segment will consist of those eight supplied as the CORPORATE SOURCE Code Package following a CORPSCE flag (see page 15, above). The remaining characters will be those of the corresponding CORPORATE SOURCE text following a <Back Space>, as described on page 12, above. Note that it is imperative that the <Back Space> text items and the later CORPSCE items be given in corresponding, and ascending order.
REPORT NUMBER(S)	This field is composed of arbitrarily many segments which are multiples of fifteen characters in length, and which possess leading workmarks. These segments are filled with the Report Number fields from the Virginia record. The MAXIMUM SEGMENT LENGTH IS THIRTY CHARACTERS, and the relative image reference KEY is character fifteen (15).

Field Name	Remarks
CONTRACT NUMBER(S)	This field is composed of arbitrarily many segments which are multiples of 15 characters in length, and which possess leading wordmarks. These segments are filled with Contract Numbers, from the VIR. The MAXIMUM SEGMENT LENGTH IS THIRTY CHARACTERS, and the relative image reference KEY is character fifteen (15).
SUBJECT TERMS	This field is composed of arbitrarily many segments which are multiples of 11 characters in length, and which have leading wordmarks. These are filled from the Subject Terms field in the VIR, including the type digit which is given there, except that type 8 terms are inserted as type 1 terms. The MAXIMUM LENGTH OF ANY SEGMENT IS 55 CHARACTERS, and the relative image reference KEY is character eleven (11). The NASA tape term arrangement is in a single alphabet for all terms.
CODED TERMS	This field is present only on the 1401 system.* It consists of arbitrarily many six-character segments, each of which is a coded version of some term which appears in SUBJECT TERMS, above. Each segment has a leading workmark and, in addition there is a wordmark

* See the more recent note on page 31.

Field Name	Remarks
	flagging the second character of the segment. The relative image reference KEY is character six (6).
	As in the case of the SUBJECT TERMS field, each segment begins with a digit which indicates the type of the term in question (1, 3, 5, or 7). The remaining five characters represent a coding of the actual term, based on the Exclusive-OR Routine, which will not be described here.

As was mentioned earlier, every field is preceded and followed by a dollar sign. The last dollar sign is followed by a not-equal sign ($\neq$), which marks the end of the NASA record.

At the time of original writing (first edition) of this document, the NASA 1401 record contained CODED TERMS, and the 1410 record did not. Recently, however, the CODED TERMS have also been added to the 1410 record. This, then, explains why the 1410 record has the form here described, although the reader is hereby apprised of the fact that additions have been made.

INPUT CODE

(Sorted by leftmost punch)

BCD	STANDARD FLEXOWRITER		ACCENT MODIFIED FLEXOWRITER	
	Lower Case	Upper case	Lower Case	Upper Case
1	1 (one)			
2	2	@	2	¢
3	4	$		
321	7	&		
4	8	*		
*421	STOP			
*431	SKIP RESTORE(AUX, 1)			
432	CONTROL(AUX, 2)		grave	circumflex
5	SPACE			
521	3	#	3	umlaut
531	5	%	5	acute
532	6	'		
541	9	(		
*542	PL 1 (2, 8, SPACE)			
*543	NON PRINT (AUX, SPACE)			
*54321	DATA SELECTOR (AUX, 3)			
6	0(zero)	)		
621	t	T		
631	v	V		
632	w	W		
641	z	Z		
642	BACK SPACE			
*643	PRINT RESTORE (AUX, ZERO)			
64321	PUNCH OFF			
651	/	?		
652	s	S		
653	u	U		
65321	x	X		
654	y	Y		
65421	,	,		
*65431	PL 4 (AUX, 1)			
65432	TAB			
7	-	"		
721	l	L		
731	n	N		
732	o	O		
741	r	R		

* This combination does not repunch on the standard Flexowriter.

BCD	STANDARD FLEXOWRITER		ACCENT MODIFIED FLEXOWRITER	
	Lower Case	Upper Case	Lower Case	Upper Case
*742	PL 2 (2, 8, -)			
743	PUNCH ON			
*74321	FORM FEED (AUX, L)			
751	j	J		
752	k	K		
753	m	M		
75321	p	P		
754	q	Q		
*75421	(Q, STOP)			
*75431	ADDRESS IDEN (AUX, J)			
*75432	F.C. ON (AUX, K)			
761	a	A		
762	b	B		
763	d	D		
76321	g	G		
764	h	H		
76421	.	.		
*76431	PL 5 (AUX, A)			
*76432	ON 2 (AUX, B)			
765	;	:		
76521	c	C		
76531	e	E		
76532	f	F		
76541	i	I		
76542	LOWER CASE			
76543	UPPER CASE			
*7654321	TAPE FEED			
8	CARRIAGE RETURN			
*843	(AUX, C/R)			

* This combination does not repunch on the standard Flexowriter.

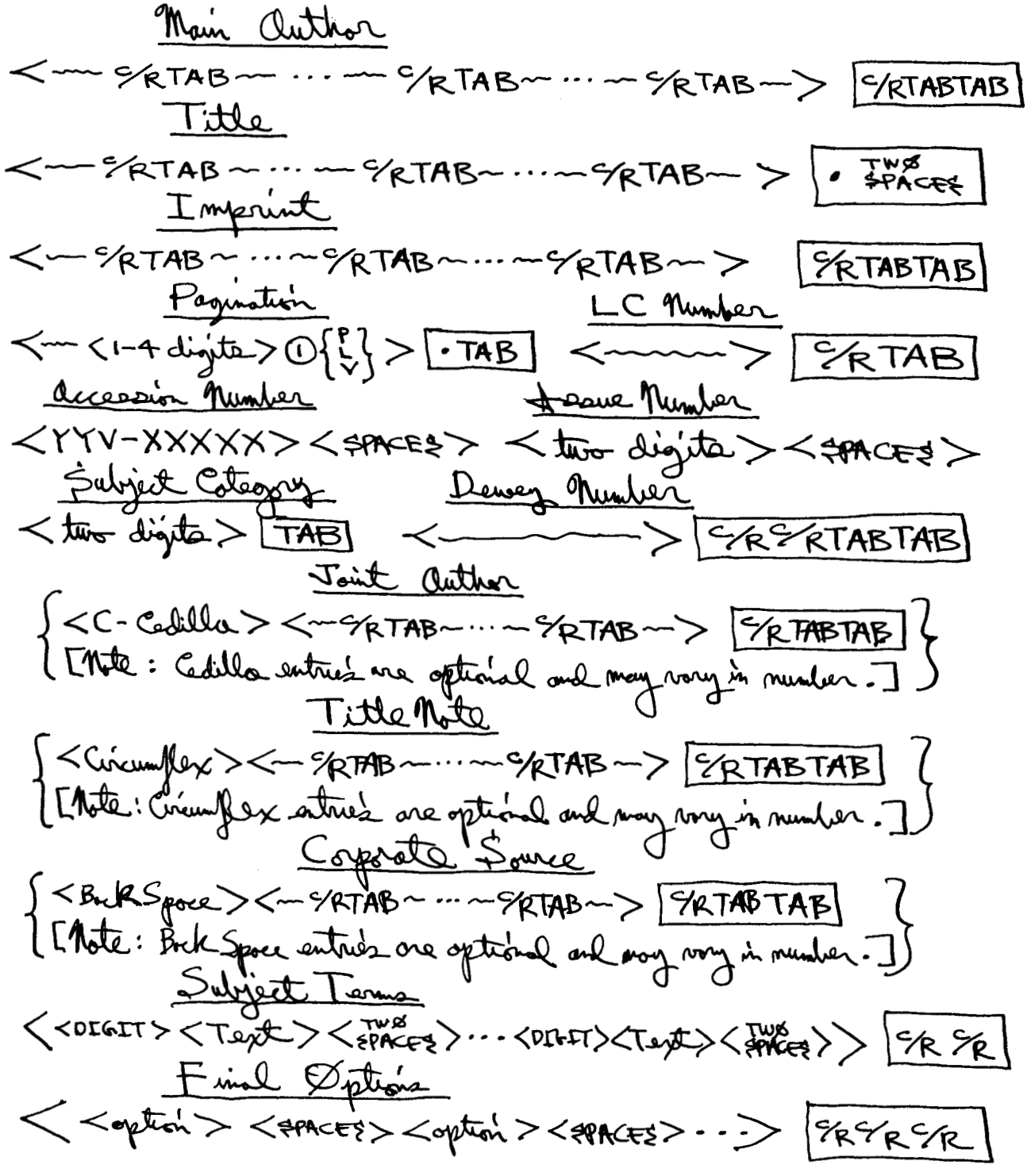
THE FLEXOWRITER PAPER TAPE CODES
(UVA-NASA PROJECT)

When keys are depressed on the Flexowriter, codes are punched into paper tape which correspond to the characters whose names are written on the keys. If these codes are later read by the B-5000 Paper Tape Reader, then characters are stored in memory. The relation between the characters punched and the characters placed in memory is as follows:

> The letters (A, B, C, . . . , X, Y, Z) are transmitted without alteration, i.e., upper case and lower case letters are placed in memory if upper and lower case letters are punched on the Flexowriter. Further, blank, period, and comma are also represented as themselves, regardless of case.
>
> The digits (0, 1, 2, . . . , 9), if they appear in lower case, represent themselves, as do the minus sign (-) and the slash (/). In upper case, however, the appearance of these characters in memory corresponds to other characters having been punched on the Flexowriter. The details of this, together with the correspondence for other characters, will now be given.

FLEXOWRITER CHARACTER		CASE	B-5000 CHARACTER	
QUOTATION MARK	"	Upper	-	(MINUS SIGN)
QUESTION MARK	?	Upper	/	(SLASH)
SEMICOLON	;	Lower	&	(AMPERSAND)
COLON	:	Upper	&	(AMPERSAND)
GRAVE ACCENT	---	Lower	>	(GTR THAN)
CIRCUMFLEX	^	Upper	>	(GTR THAN)
RIGHT PARENTHESIS	)	Upper	0	(ZERO)
UNDERLINE	---	Upper	1	(ONE)
C-CEDILLA	---	Upper	2	(TWO)
UMLAUT	---	Upper	3	(THREE)
DOLLAR SIGN	$	Upper	4	(FOUR)
ACCUTE ACCENT	---	Upper	5	(FIVE)
APOSTROPHE	---	Upper	6	(SIX)
AMPERSAND	&	Upper	7	(SEVEN)
ASTERISK	*	Upper	8	(EIGHT)
LEFT PARENTHESIS	(	Upper	9	(NINE)
UPPER CASE	UC	-----	[	(LEFT BRKT.)
CARRIAGE RETURN	C/R	-----	←	(GROUP MARK)
PUNCH ON	---	-----	*	(ASTERISK)
TAB	TAB	-----	]	(RT. BRKT.)
PUNCH OFF	---	-----	"	(QUOTE MARK)
STOP CODE	---	-----	#	(SHARP)
LOWER CASE	LC	-----	+	(PLUS SIGN)
BACK SPACE	---	-----	≠	(NOT EQUALS)

SCHEMATIC REPRESENTATION OF A VIR



REFERENCES

1. Tomlin, R. L., Jr., "The VIR Processing System," Appendix II to Letter Report on NASA Grant NGR 47-005-036, University of Virginia Library, Charlottesville, Report No. UVAL-4031-102-66U; September 1966.

2. Tomlin, R. L., Jr., "A Guide to READFIX," Appendix III to Letter Report on NASA Grant NGR 47-005-036, University of Virginia Library, Charlottesville, Report No. UVAL-4031-103-66U; September 1966.

3. Tomlin, R. L., Jr., "A Guide to DOVTAPE," Appendix IV to Letter Report on NASA Grant NGR 47-005-036, University of Virginia Library, Charlottesville, Report No. UVAL-4031-104-66U; September 1966.

4. Tomlin, R. L., Jr., "A Guide to MAKNASA," Appendix V to Letter Report on NASA Grant NGR 47-005-036, University of Virginia Library, Charlottesville, Report No. UVAL-4031-105-66U; September 1966.

DISTRIBUTION LIST

Copy No.	
1 - 10	Dr. John T. Holloway, Acting Director Office of Grants and Research Contracts Office of Space Science and Applications National Aeronautics and Space Administration Washington, D. C. 20546
11	Miss Winnie M. Morgan Technical Reports Officer Office of Grants and Research Contracts Office of Space Science and Applications National Aeronautics and Space Administration Washington, D. C. 20546
12 - 21	J. C. Wyllie University Library
22 - 41	R. L. Tomlin, Jr.
42 - 60	RLES Files